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AN OPERATING TEST OF A PILOT EDUCATIONAL MEDIA RESEARCH INFORMATION CENTER.

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RESEARCH RESULTS, TECHNIQUES, AND PROCEDURES RELATED TO THE DEVELOPMENT OF AN EDUCATIONAL MEDIA RESEARCH INFORMATION CENTER ARE REPORTED. SUBJECTS DISCUSSED INCLUDE (1) A DESCRIPTION OF ACQUISITION PROCEDURES FOR A COMPREHENSIVE COLLECTION OF NEW-MEDIA RESEARCH, (2) DETAILS ON A PILOT USER GROUP'S PARTICIPATION IN SYSTEM DEVELOPMENT AND EVALUATION, ALONG WITH DATA ON QUESTIONS SEARCHED, (3) PRELIMINARY RESULTS OF RESEARCH ON RELEVANCE AND (4) A BRIEF DESCRIPTION OF THE DEVELOPMENT OF A THESAURUS OF EDUCATIONAL TERMS. (LP)

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No1

AN OPERATING TEST OF A PILOT EDUCATIONAL MEDIA RESEARCH INFORMATION CENTER

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by

Gordon C. Barhydt

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Abstract

This report provides research results and describes techniques and procedures related to the development of an Educational Media Research Information Center by the Center for Documentation and Communication Research of the School of Library Science of Western Reserve University under contract to the U.S. Office of Education. It includes: a description of acquisition procedures for a comprehensive collection of new-media research; details on a pilot user group's participation in system development and evaluation, including data on questions searched; preliminary results of research on relevance assessments; and a brief description of the development of a thesaurus of education terms initiated under an amendment to the contract in February of 1965.

I

INTRODUCTION

Although this final report deals quite specifically with research conducted during the contract period, it should be viewed as an extension of previous reports on information retrieval research in education issued by the Center for Documentation and Communication Research (CDCR). As a record of activities this report stands alone; insofar as it makes recommendations for the operation of an Educational Media Research Information Center (EMRIC), it does so on the basis of more than four years of research and development.

Without such a developmental period, EMRIC would not now be in a position to adapt itself to the changing patterns of information service within the U. S. Office of Education. EMRIC's flexibility will permit its easy adoption as an operational service within the national framework, and could contribute almost immediately to the effectiveness of the U. S. Office of Education's Educational Research Information Center (ERIC). Beyond the development of an operational service for media researchers, the activities during the past four years provide a basis for the extension of certain information handling techniques into other areas of education. That EMRIC's contribution is generalizable beyond its original mandate is illustrated by the use of the Semantic Code Dictionary of Education Terms as the basis for the preparation of a thesaurus of education terms, begun in February of 1965, under an amendment to this contract.

II

TEAM SCANNING PROCEDURES

The procedures described here are an extension of those discussed in the final report for Title VII Project B-170a. They are intended as practical suggestions for a group of "scanners" who have the task of identifying and collecting a comprehensive file of documents.

Before the process of identification and collection begins, the system operator should establish clear criteria for inclusion, both as to content and document type (see Section IV). If survey literature is to be included, standards of significance should be established. The system operator should also define the chronological period to be covered by the collection, select the journal series to be scanned systematically, and assign each "scanner" specific journal series for examination.

Instructions for scanners are as follows.

A. Articles and References

1. Examine the full text of each article in light of the criteria for inclusion.

2. Fill out a bibliographic data card for each article which meets the requirements.

3. Enter author and pages on a separate scanning sheet prepared for each journal series.

4. If any article is a summary statement of a report from a regularly scanned or received source, e.g. Title VII, Cooperative Research etc., it can be passed by.

5. If any article is a summary statement of a report from a source not regularly scanned or received, then a card should be made (include primary source information). The same procedures should be followed for dissertations and theses.

6. Examine lists of references accompanying all selected articles. Also examine references for all articles

in the general content area, even though these articles may not meet the criteria for document type. Make a bibliographic data card for each reference of interest. Do not note references to journals or sources being scanned systematically and regularly. Mark each of these cards "lead."

7. Lead cards should include all pertinent source information.

8. In cases where a reference indicates that an article is only <u>based</u> on project research, and is not a summary statement of the total findings of that project, the primary source should also be noted. The card should clearly indicate this distinction.

B. <u>Abstracts in Journals</u>

1. Make bibliographic data cards for abstracts appearing in only those journals or reports not regularly scanned or received.

2. Make cards for abstracts of dissertations, theses, and report series not regularly received.

3. Indicate on all bibliographic data cards whether the abstract noted is adequate for the file, or whether the information can be used only as a lead to a more complete source.

All cards from all scanners should be turned in to an acquisitions supervisor who will first alphabetize selection cards by author to identify duplicates, then check non-duplicates against the collection's author file and, finally, order abstracting and/or indexing of all appropriate articles, reports, adequate abstracts, etc. The acquisitions supervisor should then sort lead cards (including inadequate abstract cards) according to source, and assign primary journal references to scanners to be checked out.

C. General

1. If two or more articles by the same author and with identical titles appear in separate publications within a two year period, they may be considered "duplicates," and only one should be included in the collection.

2. In exceptional cases, where the same experiment might be reported as a dissertation, as a paper at a meeting, and as a university report, the acquisitions supervisor will have no way of realizing they are identical since the title may be slightly different in each case. Hence such a study is put in the file three times; a large acquisitions program will preclude checking content against content.

3. Summary articles written by someone other than one of the investigators should never be included. This does not, however, exclude critical review articles.

4. The journal scanning sheets are retained by the scanners as a record of issues scanned and selections made. Even though it is assumed that a scanned series is completely covered, sometimes an article is missed. When an unfamiliar reference is found, the scanning sheet provides a double-check.

5. The acquisitions supervisor should be responsible for procuring reports from selected sources on a regular basis, and for following up leads to unpublished reports, papers at meetings, etc. Regular contact with researchers is essential if complete coverage is to be maintained. Publication lists prepared by research organizations can serve as check lists.

The above procedures furnish guidelines only; differing system requirements will undoubtedly necessitate their modification and adjustment. They have proved extremely useful in building EMRIC's comprehensive file of educational media research.

III

THE PILOT USER GROUP (1)

The primary purpose of the pilot user group was to submit questions to be searched over an expanding file of 4400 experimental studies (as of October, 1963) on or related to the new educational media. These questions were based on the real needs of the pilot users, most of whom were actively conducting their own research projects. Group members also acted as advisors, individually and collectively, on matters directly related to the particular requirements of educational media researchers. Although advisory groups in information retrieval are not an innovation, this group provided the unique advantage of advice based on actual experience and use of the system.

The CDCR, by a detailed analysis of the questions submitted and by a close working association with the user group, was able to accomplish the following:

1. determine the needs of future users in relation to
   a. subject coverage,
   b. system and sub-system design specifications,
   c. performance requirements;
2. determine not only what kinds of questions would be asked when the system became operational, but how they would be asked.

In October, 1963, the members of the pilot user group attended a three day orientation conference at the CDCR (see Appendix B). Their first function was to evaluate the inclusion criteria for the file of

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(1) This section has been adapted from Gordon C. Barhydt, The Function of Pilot User Groups in the Development of Social Science Information Centers, Educational Research Information Project Technical Report No.2, Center for Documentation and Communication Research, Aug., 1964.

research. Their comments and suggestions were noted in detail, and in June of 1964, after sufficient questions had been received, revised criteria were prepared and submitted to the group for comment. The proposed inclusion criteria (Section IV) are based on the recommendations of the pilot user group, their needs as expressed through their questions, and the experience of the CDCR in scanning thousands of documents.

Improvements in the design of the system and its sub-systems in the past two years can be traced directly to the experience gained from analyzing and searching the questions submitted. The questions indicated where modification in the depth of indexing was desirable, and enabled the CDCR to pinpoint areas where greater terminological control was necessary. Users provided feedback on the relevance of the responses received (See Section V) and evaluated other aspects of the system such as the content and quality of abstracts. In short, the questions as operationally searched by the CDCR, and the close working association established with the pilot users, permitted a thorough analysis of the strengths and weaknesses of the system.

Performance requirements for an operational service were also explored in the orientation meeting. Topics discussed included speed of response, proportion of relevant to nonrelevant documents acceptable to the user, and the maximum number of responses which a researcher could handle effectively.

Pilot user groups are obviously not a panacea for all the problems of system development. If, however, a pilot user group is comprised of a good sample of future users, then the system developer will be able to predict more accurately the needs of the users of an operational service. The pilot user group approach described has also provided the CDCR with an

opportunity to conduct research projects relating to the field of information retrieval as a whole. The degree of success of this approach cannot be measured accurately until an operational level is achieved and there is an opportunity to examine the system under real rather than simulated conditions; such an evaluation is planned for the future.

IV

CRITERIA FOR INCLUSION

The criteria discussed here represent the proposed coverage of the file. They incorporate the suggestions the pilot user group made during the October 1963 meeting, and those made subsequently during pilot searching. They are not, and cannot be, firmly fixed for all time, for the requirements of users, in the dynamic new media field, will change. They represent what the CDCR at this time believes to be the needs of media researchers. If EMRIC becomes operational, the collection itself should be modified and expanded to reflect these revised criteria.(2)

The educational media researcher is primarily concerned with experiments utilizing media in classically defined educational situations, but he also draws upon the findings of other disciplines for an understanding of the human potential for learning and for an appreciation of the media-related factors which contribute to that learning. Because of the wide range of these interests, it is exceedingly difficult to define selection criteria in terms of a complete and exhaustive list of variables pertinent to media research. These criteria, therefore, provide a guide to the contents of the EMRIC collection rather than a precise description. Every attempt has been made to make the guide a useful one.*

Newer media, as specified for this file, are those which have been made possible by technological advances, especially in the area of electronics. They include those employing the auditory (e.g., radio and recordings), the audio-visual (e.g., sound motion pictures and television),

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(2) The current actual content of the file is described in Melanie Rutzler and Gordon C. Barhydt, Preparation of a Complete and Exhaustive File of Research Abstracts in the Educational Media Field. (Final Report, Title VII, Project B-170a, U. S. Office of Education, 1963).

* Data on the collection are given in Appendix A.

and the visual (e.g., slides, filmstrips). Embraced in the definition of newer media are mechanical or electronic practice devices of the tachistoscopic type, and teaching machines and programmed materials.

Two restrictions have been placed on file content.

1. Studies must be controlled experiments or statistical surveys and their reporting must be accompanied by quantified data.

2. Experimental populations are limited to human subjects.

The criteria are organized below into sections corresponding to the major areas of file content.

A. LEARNING STUDIES

Meaningful Materials and Intentional Learning.

In the former report,(3) learning, for the media file, was defined as being intentional and concerned with meaningful materials. The meaningful materials criterion prohibited the inclusion of most studies of sensori-motor response training, problem solving of the type evidenced in maze studies, concept formation in the trial and error sense, and stimulus-response associative learning. With one exception, these restrictions did not survive the critical examination of most of the pilot users and have been eliminated. The only restriction which remains is the one excluding studies which experimentally define "learning" as the retention of reinforced guesses whose validity is completely arbitrary.

In dealing with educational media which also serve in the "mass media" role it becomes impossible always to distinguish between intentional and

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(3) Rutzler and Barhydt.

unintentional learning since even classroom experience is somewhat influenced by a "mass media" set. As a result, studies of the influences of mass media on school-related types of achievement, on study habits, or on learning or retention capacities, are included, regardless of the intent of the presentations.

Orientation to Newer Media

Maintaining an orientation toward educational media, as opposed to educational research in general, means, for example, that a study which investigates the efficiency of human learning as it is influenced by repetition of stimulus presentation would be acceptable. However, a study which focuses on the operation of learning processes in general, e.g., single or multiple-step association, even when the investigation is carried out by means of variations in number of repetitions of stimulus material, would not be accepted for inclusion. The purpose of the file is to document the influences of known functions on media utilization in teaching-learning situations and the adaptations within media construction necessitated by these functions.

Another example can be taken from the area of perception rather than cognition. A study investigating the relative values of hearing and sight in concept formation would be included; a study investigating the physical or physiological prerequisites of adequate hearing or sight would not be included. For example, studies of the physical characteristics of instructional media (size, color, shape, pitch, order, loudness, etc.) as determinants of communication potential are included, but studies of the visibility of light waves or audibility of sound waves are not. Similarly, studies of the physiology of perception (acuities, neural patterns, etc.)

have not been included. These are, perhaps, quite arbitrary decisions, and as such will be reviewed in the light of user interest.

B. MEDIA VARIABLES

Selection criteria for the file have also been based on both the "nature" and the "function" variables of both the new media (here using media in the sense of presentational vehicles) and the materials which are presented by means of these media. In some cases, research is included on the basis of the stimulus materials themselves in light of their educational application in new media situations. For example, drawings may be considered as newer media if projected by an electronic device or if made part of a teaching machine program. Since their effectiveness as an instructional material may well differ little, if at all, from the effectiveness of a similarly designed non-projected or non-programmed drawings, studies which deal with any aspect of pictorials, such as the effectiveness of degrees of iconicity in teaching-learning situations, are included in the file.

Studies involving "practice device" situations in which the device is utilized solely in the development of certain skills are not included. For example, studies of typewriting practice and computer practice to develop proficiency in the mere manipulation of keyboards are not included in the file. On the other hand, a study which involves a student's tape-recording his own voice for purposes of criticism of his speech-patterns would be included. In both cases, the "function" of the practice device, and not its hardware "nature," determines the acceptance or rejection of the study for the file.

C. SENSORY MODES

In the light of experience with the pilot user group, it appears there should be no limitations on sensory modes as subjects of study. Studies involving the variables taste, smell, sight, hearing, kinesthesia and touch, are therefore included.

D. THREE-DIMENSIONAL DEVICES

Section C, above, necessitates the inclusion of studies involving three-dimensional devices -- everything from the abacus to the modern materials of mathematics instruction, including the use of computers and programming techniques, not only as teaching machines, but as working devices used for demonstrating principles of mathematics and the physical sciences. Also, studies involving models, mock-ups, and all other forms of simulation would be included.

E. ADDITIONAL FACTORS RELATED TO NEWER MEDIA

While personality factors are important to learning, only those commonly measured within a school-type environment are included. Thus, studies of those aspects of personality which are measured by projective test methods are considered out of bounds, as are evaluations of those tests, even when they utilize the same media which are used for teaching and for achievement measurement. Also, studies of the use of media for entertainment, for advertising, or for facilitating school administration do not qualify. This means the exclusion of studies of aesthetic enjoyment per se, and studies of such effects as product marketability. However, if a study shows that aesthetic values are related to information gain, or to opinion change, with reference to the material presented, then that study

is included. Also included are studies dealing with factors which affect the persuasiveness or the memory value of commercials, because it is felt that these may be significant for educational use. Intercom systems, closed-circuit television, etc., when used for announcements, etc., within a school building, are considered to have insufficient relation to educational goals.

F. TEACHING MACHINES AND PROGRAMMED MATERIALS

One consequence of the developments in the teaching machine-programmed materials area is the necessity of considering the factors associated with non-projected printed materials in essentially the same sense as they have been studied for years with reference to textbook, newspaper, and comic book construction. Therefore, studies of typographical considerations such as those of letter and digit proportions and style, size and color of print, margin size, and placement of illustrations are included.

Inclusion criteria for the new media collection attempt to reflect the significant variables of new media research. Variables associated with teaching (expository) devices group around display characteristics, sensory modes, item sequence, step size, bases for progression from item to item form of response, choice of reinforcement, characteristics of objective tests, and the psychological and physiological bases of these variables. More specifically, studies investigating the following variables are included.

1. Display characteristics: various graphic forms (including letters and numbers), dial and scale intervals, pictorial representations, auditory or other sensory signals, verbal presentations as affected by such factors as association and context, and the effect on intelligibility of exposure times.

2. Sensory modes: speeds of apperception and spans of sensory memory, as well as the place and effectiveness of single and combined presentation modes.

3. Item sequence: considerations of primacy and recency, proactive and retroactive inhibition, pre-training, instructional set, and whole or part presentation within the limits of a single program.

4. Step size: measurements of attention and immediate memory spans; evaluations of deduction, induction and other problem-solving techniques, mnemonic techniques, and cueing procedures as the basis for progression from item to item.

5. Form of response: evaluation of overt versus covert, written versus spoken, recognition versus recall, etc.

6. Reinforcement: positive versus negative stimuli, repetition, knowledge of results, and reward; related questions raised by objective test methods, such as the value of various prompts, of multiple-choice versus completion, and no choice correct.

A result of substituting a variables definition for a device definition, is the recommendation that the media file include validation studies of non-verbal tests of the paper and pencil variety. Such studies have been excluded except for the rare cases where projected or recorded stimuli have been used.

A user must know whether his information request coincides with the scope and coverage of an information center's file. He must be confident that the number of responses to his query is indicative of the number of completed

research studies in his area of interest, given that the system is operating efficiently and effectively. A definitive outline of the file's scope and coverage is therefore a necessity. These criteria are a step in that direction.

V

SEARCH RESULTS (4)

Most, but not all of the pilot user group submitted requests for searches. Therefore, additional users were recruited in August of 1964 when it became apparent that more "real questions" were needed to satisfy the CDCR's experimental demands. Every effort was made to keep the total number of users to a minimum; experimentation and not service was the objective of pilot operation.

Search requests were submitted on a form which required (a) statement of the question on three levels -- generic, more specific, most specific, (b) definitions of special terms, and (c) a statement of research purpose (see Appendix C). Not all users filled in all sections of the form: providing definitions, for example, was apparently quite difficult. New recruits to the user group frequently did not use the form, and to what extent use or non-use influenced search results is not known.

Each question was searched over a file of approximately 4400-4700 documents. The total number of documents varied from search to search because of an active current acquisitions program. Responses to questions were in the form of citations with 250-300 word abstracts. Although an evaluation of the relevance of the total output was desirable, it was felt that a researcher could reasonably be expected to evaluate no more than fifty responses to his question. Where the search yielded a larger number, a randomization program selected only fifty for evaluation by the

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(4) This section is a revision of Barhydt, Gordon C., Charles T. Schmidt and Melanie G. Rutzler, "An Educational Media Research Information Center (EMRIC): Progress Report," AV Communication Review, Vol. 13, No. 3, fall 1965, pp. 296-302.

questioner. Questioners were asked to give a yes-no evaluation of relevance: a relevant abstract being one which, on the basis of the information provided, describes research which appears to be directly or peripherally related to the question. Many questioners did indicate, in addition, why an abstract was considered relevant or non-relevant.

Below are the questions searched for which complete data are available.* Group A contains those questions which fall directly within the scope of the file, i.e., the system should have collected everything of interest to the questioner. Group B questions are those which do not fall directly within the scope of the file, i.e., at least some of the research of interest to the questioner does not meet the system's criteria for inclusion and would not have been included in the file.

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* Questions submitted and searched, for which complete data are unavailable, are listed in Appendix C.

Group A

QUESTIONS	1 TOTAL OUTPUT	2 NO. OF ABSTRACTS EVALUATED	3 NO. OF RELEVANT ABSTRACTS IN 2
1. The effects of using the newer media to teach disadvantaged urban school children.	93	50	38
2. All studies in which audio is a variable.	1279	50	17
3. The effect of using visual presentations for review, on retention and transfer of learning.	161	50	1
4. The relationships between initial individual differences (both aptitude and achievement) and learning from instruction via motion pictures or television.	116	50	38
5. The effects of auditory response panels of programmed material, both separately and in connection with visual presentations, on learning of young adults.	71	50	12
6. The impact of new educational media on pupil classroom behavior measured by direct behavioral observation.	85	50	5
7. The attitudes of university faculty members toward the utilization of the newer media for university courses.	41	41	32
8. Research on the optimal integration of various media in developing listening comprehension in secondary school foreign language instruction.	17	17	7
9. Studies of the use of motion pictures as stimuli in tests which predict teacher effectiveness.	59	50	13
10. The effects of emotional involvement on film learning: comparison of effects of dramatic and expository versions of selected films.	625	50	7
11. The use of newer media in Latin America.	5	5	5
12. The effects on learning when filmstrips are programmed with small steps, require immediate student response, provide immediate knowledge of results, and allow for individual self-pacing.	50	50	25
13. The effects of varied and combined sense modality presentation of material upon learning by young children.	103	50	6

Group A continued

QUESTIONS	1 TOTAL OUTPUT	2 NO. OF ABSTRACTS EVALUATED	3 NO. OF RELEVANT ABSTRACTS IN 2
14. Studies of the effect of motion pictures on attitudes.	98	50	29
15. Studies of the effectiveness of language laboratories.	78	50	49
16. The extent of utilization and the effectiveness of multi-media presentations.	127	50	14
17. What relationships have been reported between specific learning situations and the appropriateness of the newer media used?	653	50	33
18. The use of individual school-to-home telephone in conjunction with radio-broadcast lessons in the education of chronic, physically handicapped homebound adolescent students.	31	31	0
19. Utilization and effectiveness of audio recordings in classrooms (other than foreign language learning).	139	50	45
20. The use of newer media to help teachers assess children's intellectual ability.	94	50	20
21. The nature and effects of non-verbal (iconic, analogical, pictorial) signs and symbols in communication and in learning.	156	50	37
22. The effects on learning when a group of subjects use a teaching machine or programmed instruction as a group activity rather than individually as was planned when the programmed material was written.	5	5	3
23. The effect of typing skill on learning via computer-assisted instruction when the student's responses to programmed materials are to be made on an electric typewriter.	15	15	2
24. The effects of personality factors of subjects learning from programmed materials (especially from computer-assisted instruction).	14	14	6
25. The effects on learning when a student uses a filmstrip (or a motion picture or a recording) individually rather than exposed to it as a member of a group.	18	18	8

Group A continued

QUESTIONS	1 TOTAL OUTPUT	2 NO. OF ABSTRACTS EVALUATED	3 NO. OF RELEVANT ABSTRACTS IN 2
26. Use a combination of audiovisual aids in a course of instruction to effect learning.	553	50	1
27. The effect of increasing the similarity between responses required during practice and transfer of a paired-associate task when the transfer task required discrete, instrumental, overt responses, and when time intervals prior to and following the presentation of the stimulus which defines the correct responses (information feedback, response term, reinforcement) are controlled and the stimulus consequences of the response itself (as written word, a displaced switch, etc.) are controlled.	17	17	11
28. Research on ETV which involves multi-media input.	53	50	13
29. Research on classroom communicators and student response systems.	93	50	6
30. The use of teaching machines and programmed learning at the high school and college levels.	143	50	34
31. Media research involving underprivileged students at the high school and college levels.	71	50	11
32. Overhead projectors and transparencies.	21	21	15

Group B

QUESTIONS	1 TOTAL OUTPUT	2 NO. OF ABSTRACTS EVALUATED	3 NO. OF RELEVANT ABSTRACTS IN 2
1. The function of sensory modes in (a) verbal learning, or (b) individual differences of learners.	318	50	30
2. The efficiency of transmitting information through two sensory modalities, vs. one modality.	318	50	20
3. The effects of rate of pacing of instruction on achievement and student attitudes.	123	50	48
4. Research dealing with the teaching, learning or discovery, of problem-solving techniques, inductive thinking, originality, principles and concepts.	312	50	15
5. Research which studies the interaction of student attitude, tolerance of ambiguity, and self-instruction, programmed learning, lecture-discussion or multi-media teaching methodologies.	42	42	15
6. The use of sensitization to visual cues and clues for changing the behavior of a subject in the picture (visual feedback).	86	50	1
7. The effect on transfer of the sequence of presentation of materials in a multiple-task problem.	65	50	3
8. The relative effectiveness of discovery versus direct exposition as a method of learning or instruction.	138	50	30
9. The relationships among amount of reinforcement, complexity of task, and ability of the subjects.	9	9	4
10. The effects of reinforcement condition on the performance of discrimination and probability learning tasks in children and mental retardates.	21	21	9
11. Variables influencing paired-associate learning, serial learning, and verbal discrimination learning by mental retardates.	7	7	5

Group B continued

QUESTIONS	1 TOTAL OUTPUT	2 NO. OF ABSTRACTS EVALUATED	3 NO. OF RELEVANT ABSTRACTS IN 2
12. The use of manipulatory drive as motivation and the manipulation of stimuli as reinforcement in learning by young children.	78	50	0
13. What factors are related to speech intelligibility, from the point of view of the listener?	55	50	27
14. The effect of stimulus complexity on the way that subjects utilize information in a concept learning situation.	28	28	15
15. The relative effectiveness of discovery versus direct exposition as a method of learning or instruction.	138	50	30
16. Individual differences as the dependent variable in learning experiments.	86	50	30
17. Experimental studies measuring college students' change of attitude toward any facet of the higher learning experience over time.	53	50	5

One of the difficulties in assessing system effectiveness for a large collection is that it is virtually impossible to determine whether any relevant answers have been missed by a search. No user, however dedicated or interested, is willing to search 4500 documents manually to identify those which should have been retrieved but were not. And there are indications that only the user himself can accurately assess relevance to his own personal information need (See Section VII). However, an opportunity to isolate missed answers came in January of 1965.

A collection of abstracts by MacLennan and Reid at the University of Missouri on the use of films or television for instruction was made available to the CDCR.(5) Of the 334 separate studies in MacLennan and Reid, 307 were in the CDCR's media file. Five of the 27 not represented had been examined and rejected, four were in process, and the remainder, nine of which were unpublished reports, had not been identified by the CDCR's acquisitions program. In consultation with one of the authors of the Missouri collection, a search program was constructed which theoretically should have identified all of the 307 documents indexed and on tape at the CDCR. The search did identify 236, or 77% of the known relevant answers. The search program also identified an additional 500 documents judged relevant by the CDCR project staff. Although no evaluation of this additional output has been made by the user as yet, the straightforwardness of the search request would seem to indicate a high proportion of relevant answers.

Evaluation of a more subjective nature was provided through personal communication with members of the pilot user group. A large proportion of the pilot users expressed satisfaction with search results. Adverse criti-

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(5) MacLennan, Donald W. and J. Christopher Reid, Abstracts of Research on Instructional Television and Films, prepared for the Institute of Communication Research, Stanford University, under contract to the U. S. Office of Education.

cism was most frequently addressed to two areas: scope of the collection and information content of abstracts. Many of the pilot users found the scope of the collection too narrow, and the level of information content of abstracts prepared early in the project too low. The revised criteria for inclusion (Section IV) will, if applied, broaden the scope of the collection along the lines recommended by pilot users. Early abstracts should be expanded; subsequent abstracts appear to be quite adequate. Although these criticisms are not directly related to the search results given above, they must be considered when evaluating the effectiveness of the service.

VI

INDEXING GUIDELINES

These guidelines are a distillation of the CDCR's experience in the indexing of educational research literature. It is hoped that they will prove useful to the many other U. S. Office of Education contractors now involved in the analysis and indexing of research documents.

The following types of information should be included wherever possible in the index to a research document.

I. Population under Study

A. General classification of educational status.

Examples: student
teacher
trainee
administrator

B. Where applicable, indication of the existence of experimental and control groups.

C. Age or grade level, or designation of occupational environment.

Examples: high school
adolescent
U. S. Army
industry

D. Attributes or characteristics of population.

(1) Sex -- to be designated if population consists of only males or only females.

(2) Intelligence and ability levels.

Examples: gifted
slow learners

(3) Physical or emotional characteristics.

Examples: deaf
handicapped
disturbed

(4) Socioeconomic characteristics, or characteristics which may have socioeconomic implications.

Examples: migrant
low socioeconomic level
rural
suburban

(5) Race, religion, nationality.

Examples: Negro
white race
French nationality.

II. Actual subject or curriculum taught.

Examples: physics
French
chemistry
algebra
American history
knot tying
radio code operation
computer programming

III. Device or method of teaching.

Examples: lecture-demonstration
language laboratory
teaching machine
filmstrip
link trainer
programmed text
conventional textbooks

IV. Components of and variables closely connected with the teaching device or method.

A. Teaching devices.

Examples: (1) teaching machine

small step
self-paced
constructed written response
varied typographical cue
branching

(2) filmstrip

programmed
color
cartoon
sound track
group paced
inserted question

(3) film

achromatic
silent
part presentation
active practice participation
small group
varied viewing distance

B. Teaching method

Examples: (1) lecture

face to face presentation
large group
classroom communicator

V. Major processes involved in study

A. Teaching is to be used as an index term in the following cases:

(1) In a research review, many studies which individually treat of specific "subjects taught" may be discussed. Since the lengthy listing of all these specific subjects taught would be a fallacious index to the actual depth of the research review, the term teaching is used as a general indexing term.

(2) In a study which has as its focus the teaching of, say, a mathematical concept by means of a teaching machine, when this process is not actually a part of a mathematics curriculum, the word teaching is used as an index term.

B. Grouping or matching processes

Examples: (1) random grouping

(2) matching (on the basis of)

IQ
socioeconomic level
mathematics achievement

C. Testing

(1) general type of test

Examples: recall
transfer
mechanical aptitude
anxiety scale
motor performance test
non-verbal French achievement

(2) response type

Examples: multiple choice
true-false
essay
free response

(3) temporal placement

Examples: pretest
posttest (immediate, delayed)
time lapse

(4) situational variables

Examples: high noise level
music distraction

D. Learning when no actual curriculum is involved and when the efficacy of no specific piece of hardware is under scrutiny.

Examples: (1) learning
paired associate list

(2) learning
conceptual task

E. Other examples of major processes.

(1) observing
student-teacher performance
(by means of) TV

(2) evaluating
educational films
(by means of) TV

(3) recording
student discussion
(by means of) videotape

(4) surveying
parent attitude
(toward) ETV
(by means of) questionnaire
(by means of) telephone

(5) listening (to)
persuasive speech

VI Independent and dependent variables, clearly linked in proper relationships.

Examples: (1) experimental group
algebra achievement DV

discovery method
rigidity level IV

control group
algebra achievement DV

lecture-demonstration IV

(2) experimental group
physics achievement DV
completion time

programmed text
branching format IV
IQ

control group
physics achievement DV
completion time

programmed text
linear format IV

VII Auxiliary findings which cannot be designated as either dependent or independent variables because of non-control in the experimental design.

Examples: (1) teacher attitude
(towards) programmed text

(2) programmed text
availability

VII

RELEVANCE ASSESSMENTS (6)

Responses to questions posed to information retrieval systems or centers are frequently evaluated before delivery to a questioner. Although this was not the case during the pilot operation of EMRIC, it was thought that research into the subjectivity of evaluation judgments might provide useful information for an operational service. The specific purpose of this portion of the CDCR's research activities under the present contract was to investigate the effectiveness of measures of relevance based on non-user evaluation.

Fourteen questions submitted by members of the pilot user group were searched over a file of 4000 documents. All fourteen questions were based on research projects being conducted by the pilot users.

A sample of 50 responses, randomly selected from the total number of responses identified for each search, was given three evaluations: by the user; by an expert; and by a system specialist, where these are defined as follows:

user:	the individual posing the question.
expert:	a non-user subject specialist.
system specialist:	a non-user, non-subject specialist.

User, expert and system specialist were asked to indicate for each response in the sample, (an abstract of 250-300 words), whether the response was relevant or nonrelevant. A relevant response is defined as one which, on the basis of the information provided, describes research which

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(6) This section appeared as A Comparison of Relevance Assessment by Three Types of Evaluator: Educational Research Information Project Technical Report No. 1 (Cleveland: Western Reserve University), August, 1964. 4 p. Also in Proceedings of the American Documentation Institute 27th Annual Meeting, Vol. 1 (Parameters of Information Science), Philadelphia, Pennsylvania, October 5-8, 1964. Washington, 1964, pp. 383-385.

appears to be directly or peripherally related to the question.

Both expert and system specialist were given copies of the questions as submitted in writing by the user. No additional information was provided and no contact was made with the user.

The effectiveness of the relevance assessments by expert and system specialist was determined by the method developed by Goffman and Newill.(7)

Effectiveness u is considered as a function of two variables, -- sensitivity (Se) and specificity (Sp),

$$u = G(Se, Sp)$$

where sensitivity is a measure of an evaluator's ability to identify the relevant documents and specificity is a measure of an evaluator's ability to identify the nonrelevant documents.

Considering Se and Sp as conditional probabilities, they define

$$u = P_I(A) + P_{I'}(A') - 1,$$

where I represents the ideal set of documents (those identified as relevant by the user), I' its complement, A the set of documents identified as relevant by the evaluator, and A' its complement. u can range from - 1 to + 1 and a value of zero represents a random selection by the evaluator.

In this experiment we can approximate sensitivity by

$$\frac{A \cap I}{I}$$

and specificity by

$$\frac{A' \cap I'}{I'}$$

---

(7) Goffman, William and Vaun A. Newill, M. D. Methodology for Test and Evaluation of Information Retrieval Systems: Comparative Systems Laboratory Technical Report No. 2 (CSL: 7 R-2), (Cleveland: Western Reserve University), July, 1964. 19 p.

The results given in table 1 indicate that for most questions the effectiveness of both expert and system specialist was quite low. The results also indicate a high correspondence in the measures of sensitivity, specificity and effectiveness, between expert and system specialist. It should be noted that expert and system specialist are apparently not making random selections.

Because of the small number of questions used for this report no definite conclusions can be reached. If further investigation on a larger number of questions substantiates these results, there would appear to be implications for the evaluating function as performed by anyone other than the user.

Collection of data from an additional 20-25 questions is in progress and a complete analysis of results will be submitted for publication.

Question	Expert			System Specialist		
	Sensitivity	Specificity	Effectiveness	Sensitivity	Specificity	Effectiveness
1.	.6667	.7500	.4167	.6667	.8000	.4667
2.	.2000	.9000	.1000	.1000	.9333	.0333
3.	.5789	.9167	.4956	.4474	1.0000	.4474
4.	.4118	1.0000	.4118	.5882	.8485	.4367
5.	1.0000	.9796	.9796	1.0000	.9592	.9592
6.	.8158	.6667	.4825	.7105	.8333	.5439
7.	.4167	.9474	.3640	.5833	.8947	.4781
8.	.4375	1.0000	.4375	.3542	1.0000	.3542
9.	.6000	.8667	.4667	.4000	.9333	.3333
10.	1.0000	.7600	.7600	1.0000	.8800	.8800
11.	.3846	.9730	.3576	.0769	1.0000	.0769
12.	.6000	.8000	.4000	.6000	.6857	.2857
13.	.4286	.8837	.3123	.4286	.8605	.2890
14.	.8889	.9130	.8019	.7778	.8261	.6039

Table 1.

VIII

PREPARATION OF A THESAURUS OF EDUCATION TERMS*

A thesaurus for information retrieval is a word-association list structured to enable indexers and subject analysts to describe the subject information of a document to the desired level of generality or specificity at input, and to permit searchers to describe in mutually precise terms the information required at output. A thesaurus therefore serves as an authority list and as a device to bring into coincidence the language of documents and the language of questioners. Usage of terms is delimited and interterm relationships are displayed. In this manner the thesaurus is an essential and effective tool for both indexers and searchers.

Following the example set by other centers in other disciplines, ERIC and others have applied, or propose to apply, the techniques of coordinate indexing. Experience teaches that the control of terminology is a common problem that each such system must solve. It was therefore the CDCR's firm conviction that a thesaurus should be developed as a necessary and useful tool for ERIC and for other organizations engaged in collecting, analyzing and disseminating education information. Contact with such organizations both individually and on a group basis has confirmed our belief that the development of a thesaurus will provide a basic indexing language which can be utilized both for generalized and specialized purposes. Standardization of indexing languages will improve communications both within and between education information centers.

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* Initiated in February, 1965, under an amendment to the contract.

Since the initiation of the contract amendment, work has proceeded in the task of identifying significant terms for inclusion in the thesaurus. An important source of such terms has been the Semantic Code Dictionary of Education developed and maintained at the CDCR, which represents the accretion of index terms assigned to articles and reports over the past four years. Terms have been gathered from other sources -- the index to the Encyclopedia of Educational Research, titles of Cooperative Research reports, etc. -- and incorporated into the thesaurus as candidate entries.

Preliminary criteria have been developed for inclusion/exclusion of terms. A core list of some 5000 terms has been accumulated, which reflects both deletions and additions to the original list as provided by the Semantic Code Dictionary. Candidate terms have been sorted into categories which are analogous to the facets of a faceted classification. The CDCR intends to incorporate the basic elements of a faceted classification into the thesaurus at this time because it believes such an arrangement offers several advantages not found in more conventional approaches. Among these advantages are:

1. A more usable and more effective display of hierarchical, synonymous and collateral relationships among terms and sets of terms.

2. More consistency in term selection for indexing and searching by providing a more rigidly structured vocabulary.

3. A reduction in the number of RT's (related terms) for each individual entry in the thesaurus, thereby facilitating indexing and searching.

Certain parallels exist between the development of a thesaurus of education terms and the development of thesauri by the Engineers Joint Council (EJC) and the American Petroleum Institute (API). These have been explored fully with information experts closely associated with the EJC and API.

IX

RECOMMENDATIONS FOR OPERATION OF EMRIC

EMRIC is seen as one part of a national network of information centers serving the needs of all of education. EMRIC's responsibilities therefore are twofold: first, to serve the information needs of the media researchers for whom it was developed, and second, to integrate its activities with the national center (ERIC). Effectively serving the needs of media researchers will require the translation of pilot user recommendations into practice and the implementation of techniques developed by the CDCR's research program. Integration of EMRIC's activities with those of ERIC necessitates the establishmenc of compatible techniques and procedures between these two information centers.

The CDCR's recommendations for operation are based upon a full realization of the responsibilities above. The recommendations are as follows:

1. The CDCR recommends the establishment of EMRIC as an operational service in the very near future. User response during the past 18 months has substantiated the need for service and demonstrated its potential.

2. EMRIC's techniques and procedures should be made compatible with ERIC's. Although input and output formats should be standardized wherever possible, provision must be made for the specialized requirements of EMRIC's users.

3. A continuing research program within EMRIC will ensure the further development and refinement of techniques and services.

APPENDIX A

COLLECTION DATA

PART I.....SOURCES OF DOCUMENTS IDENTIFIED AND/OR ACQUIRED DURING THE CONTRACT PERIOD.

PART II.....TOTAL NUMBER OF DOCUMENTS PROCESSED AND IN-PROCESS.

PART I: SOURCES OF DOCUMENTS IDENTIFIED AND/OR ACQUIRED DURING THE CONTRACT PERIOD

APPENDIX A.

JOURNALS AND PERIODICALS	Documents Identified and/or Acquired 7/1/63 to 6/30/64	7/1/64 to 6/30/65
1. AACTE Bulletin	5	
2. Acoustical Society of America. Journal		1
3. Acta Ophthalmologica	2	
4. Alberta Journal of Educational Research	2	
5. American Educational Research Journal	4	3
6. American Journal of Psychology	14	2
7. American Psychologist	14	5
8. Arithmetic Teacher		1
9. Audiovisual Instruction		2
10. AV Communication Review	13	3
11. British Journal of Educational Psychology		4
12. British Journal of Psychology	2	
13. California Journal of Educational Research	2	2
14. Canadian Journal of Psychology	2	
15. Catholic Educational Review	1	
16. Child Development	6	1
17. Clearing House	2	
18. Dissertation Abstracts	117	119
19. DSH Abstracts	3	
20. Educational and Psychological Measurement	2	
21. Educational Research (British)	1	

PART I: SOURCES OF DOCUMENTS IDENTIFIED AND/OR ACQUIRED DURING THE CONTRACT PERIOD
continued

	Documents Identified and/or Acquired	
	7/1/63 to 6/30/64	7/1/64 to 6/30/65
22. Educational Screen and Audio-Visual Guide	1	
23. Elementary English	1	
24. Elementary School Journal	1	2
25. Exceptional Children	1	
26. Florida Journal of Educational Research	2	
27. High Points		1
28. Hispania	1	
29. Home Study Review		1
30. International Journal for the Education of the Blind		2
31. Iowa Academy of Science: Proceedings	2	
32. Journal of Abnormal and Social Psychology	2	2
33. Journal of Applied Psychology	15	5
34. Journal of Broadcasting	1	
35. Journal of Business Education		1
36. Journal of Chemical Education		1
37. Journal of Communication	1	2
38. Journal of Comparative and Physiological Psychology	1	1
39. Journal of Developmental Reading	18	1
40. Journal of Educational Psychology	14	8
41. Journal of Educational Research	6	4
42. Journal of Engineering Education	1	
43. Journal of the Experimental Analysis of Behavior	1	
44. Journal of Experimental Education	5	
45. Journal of Experimental Psychology	56	17

PART I: SOURCES OF DOCUMENTS IDENTIFIED AND/OR ACQUIRED DURING THE CONTRACT PERIOD
continued

	Documents Identified and/or Acquired	
	7/1/63 to 6/30/64	7/1/64 to 6/30/65
46. Journal of General Psychology	3	1
47. Journal of Home Economics	2	
48. Journal of Medical Education		8
49. Journal of Programed Instruction	12	3
50. Journal of Psychology	7	1
51. Journal of Reading		2
52. Journal of Research in Music Education	2	
53. Journal of Research in Science Teaching	1	1
54. Journal of Social Psychology	1	1
55. Journal of Speech and Hearing Disorders	2	1
56. Journal of Verbal Learning and Verbal Behavior	5	4
57. Junior College Journal	2	
58. Mathematics Teacher	2	1
59. Modern Language Journal	2	4
60. NAEB Journal (Research Fact Sheets)	7	1
61. NSPI Journal		4
62. National Business Education Quarterly	2	2
63. National Elementary Principal	1	
64. Negro Educational Review	1	
65. Ontario Journal of Educational Research		2
66. Optometric Weekly		1
67. Peabody Journal of Education	1	
68. Perceptual and Motor Skills		1

PART I: SOURCES OF DOCUMENTS IDENTIFIED AND/OR ACQUIRED DURING THE CONTRACT PERIOD
continued

	Documents Identified and/or Acquired	
	7/1/63 to 6/30/64	7/1/64 to 6/30/65
69. Personnel Journal		3
70. Phi Delta Kappan	2	
71. Programmed Learning (British)	1	4
72. Psychological Abstracts		10
73. Psychological Bulletin	6	
74. Psychological Monographs	2	
75. Psychological Record	1	
76. Psychological Reports	12	4
77. Psychological Review	1	
78. Quarterly Journal of Experimental Psychology	1	1
79. Review of Educational Research	2	1
80. School Life	1	
81. School Science and Mathematics		1
82. School and Society	2	
83. Science Education	4	
84. Speech Monographs	15	5
85. Speech Teacher	2	1
86. Teachers College Journal (Indiana)	1	1
87. Texas Journal of Science		2
88. Texas Outlook	1	
89. Times Educational Supplement	1	
90. Theory into Practice	1	
91. Training Directors Journal (Formerly "Journal of the American Society of Training Directors")		4
92. Training Research Abstracts	4	4
93. Volta Review	1	

PART I: SOURCES OF DOCUMENTS IDENTIFIED AND/OR ACQUIRED DURING THE CONTRACT PERIOD
continued

	Documents Identified and/or Acquired	
GOVERNMENT REPORTS	7/1/63 to 6/30/64	7/1/64 to 6/30/65
1. Air Force	47	12
2. Army	7	1
3. Navy	27	7
4. USOE, Cooperative Research Project	38	5
5. USOE, NDEA Title IV Project	1	
6. USOE, NDEA Title VI Project	8	
7. USOE, NDEA Title VII Project, Part A	60	18
8. USOE, NDEA Title VII Project, Part B	50	36
9. USOE Reports (Miscellaneous)	2	1
OTHER		
1. Associations	24	
2. Boards of Education	24	
3. Books (Commercially published)	11	
4. Corporations	11	4
5. Doctoral Dissertations (Original)	93	1
6. Foundations	1	
7. Master's Theses (Original)	215	5
8. Research Institutes	5	
9. University Non-degree Studies	36	6
Totals	1098	365
Grand Total	1463	

PART II: TOTAL NUMBER OF DOCUMENTS PROCESSED AND IN-PROCESS

APPENDIX A.

Documents processed during contract period	992 *
Documents in-process at end of contract period	471 **
Documents previously processed (1961-63).	3716
TOTAL NEW MEDIA COLLECTION	5179

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* On magnetic tape and searchable.

** Abstracted and indexed but not transferred to magnetic tape.

APPENDIX B

PILOT USER GROUP

PART I.....LETTER OF INVITATION

PART II.....CONFERENCE PROGRAM

PART III.....LIST OF MEMBERS

PART I: LETTER OF INVITATION

APPENDIX B.

WESTERN RESERVE UNIVERSITY
CLEVELAND 6. OHIO

CENTER FOR DOCUMENTATION
AND COMMUNICATION RESEARCH
SCHOOL OF LIBRARY SCIENCE

August 16, 1963

Dear_____:

Since 1961, the Center for Documentation and Communication Research of the School of Library Science of Western Reserve University has conducted, under contracts with the U. S. Office of Education, research and development activities leading toward the establishment of a mechanized information retrieval system for the literature of educational research. During the past year the activities of the Center have focused on the accumulation of a large file of media-related research from 1920 to the present.

The Center for Documentation and Communication Research wishes to extend to you, as a leading researcher, an invitation to participate, over a period of 18 months, in an experimental user group for the file of media-related educational research. Members of the user group will be able to request up to eight literature searches (at no charge) in their particular areas of interest related to educational media.

We wish to test thoroughly, under experimental conditions, the abstracting, indexing and computerized searching techniques that have been developed. Participants in the group will be asked to provide regular feedback to the Center so that evaluations of system effectiveness from both a statistical and subject analysis point of view may be made.

A user group conference will be held October 6-9, 1963, in Cleveland, at which time an orientation to the system and the experimental procedures will be given. Since all the members of the user group will attend this conference, the occasion will also provide an opportunity for a stimulating exchange of ideas. Travel expenses to and from Cleveland, hotel rooms, and meals for participants are provided for under our current contract with the Office of Education.

The Center and the Office of Education feel that the formation of this user group will provide unprecedented opportunities for objective evaluation of the first mechanized information retrieval system developed for educational research literature. A more detailed outline of the development of the system is enclosed.

If you have any questions, please do not hesitate to write or call collect (216) Ce-1-7700, Ext. 317, to Mr. Gordon Barhydt, manager of the projects. We are anxious to complete arrangements for the conference by August 31, and hope you will give us a favorable reply.

Sincerely yours,

A. J. Goldwyn
Executive Director

AJG/ra
Enclosure:

PART II: CONFERENCE PROGRAM

APPENDIX B

Educational Media Research Information Center

User Group Conference

October 6-9, 1963
(Wade Park Manor, Cleveland, Ohio).

Conducted by

Center for Documentation and Communication Research*
School of Library Science
Western Reserve University

The purposes of the conference are:

- to provide a basic introduction to the system and its capabilities;
- to provide complete details on user opportunities and responsibilities;
- to provide details on the mechanics of the testing and evaluation; and
- to encourage critical evaluation.

Jesse H. Shera, Dean, School of Library Science and Director, Center for Documentation and Communication Research, will present the welcoming address Sunday evening, October 6.

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* Under contract to the U. S. Office of Education.

SCHEDULE OF MEETINGS

Monday, October 7

A. M.

9:00-9:10	General Introduction	Gordon C. Barhydt Manager, Research Project CDCR
9:10-9:30	Role of the U. S. Office of Education	Gerald Torkelson Media Branch USOE
9:30-10:00	System Introduction	Staff
10:00-10:15	Question Period	
10:15-10:30	Refreshment Break	
10:30-10:45	Acquisition	Staff
10:45-11:15	Analysis	Staff
11:15-11:45	Coding	Staff

P. M.

1:30-3:00	Tour of Documentation Center	
3:00-3:15	Refreshment Break	
3:15-3:30	Question Period	
3:30-4:30	User Group Research and Activities	User Group Members
4:30-5:00	Classification and Indexing in the Social Sciences	A. J. Goldwyn Executive Director CDCR

PART II: CONFERENCE PROGRAM
continued

APPENDIX B

Tuesday, October 8

A. M.		
9:00-9:20	User Needs	Alan M. Rees Assistant Director CDCR
9:20-9:45	Question Analysis	Staff
9:45-10:15	Posing a Question	Staff
10:15-10:30	Refreshment Break	
10:30-10:45	Inclusion Criteria	Staff
10:45-11:45	User Group Research and Activities	User Group Members
P. M.		
1:30-2:30	Evaluation Workshop	Staff
2:30-2:45	Question Period	
2:45-3:15	Current Research	Staff
3:15-3:30	Refreshment Break	
3:30-4:00	Future Research	Gordon C. Barhydt
4:00-5:00	User Group Research and Activities	User Group Members

Wednesday, October 9

A. M.		
9:00-9:30	Implications for Education	John Diekhoff* Professor of Education University of Michigan
9:30-9:45	Question Period	
9:45-10:15	Summary of Activities	Jessica S. Melton Associate Director CDCR
10:15-10:30	Refreshment Break	
10:30-11:00	Conclusions	Gordon C. Barhydt

* Now Associate Dean of the Faculty of Arts and Sciences, WRU.

PART III: LIST OF MEMBERS* APPENDIX B.

Dr. William Allen
Director of Research
Department of Cinema
University of Southern
California
Los Angeles, California

Dr. James J. Asher
Associate Professor
Department of Psychology
San Jose State College
San Jose 14, California

Dr. James Beaird
Assistant Research Professor
Oregon State System of
Higher Education
Teaching Research
Monmouth, Oregon

Dr. Bruce Biddle
Associate Professor of
Psychology and Sociology
University of Missouri
Columbia, Missouri

Dr. Richard I. Evans
Professor of Psychology
University of Houston
Cullen Boulevard
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Dr. Edgar Farley
Assistant Superintendent
in Charge of Instruction
Garden City Public Schools
Garden City, New York

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American Institute for Research
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Dr. James Hawker
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Austin, Texas 78763

Dr. John F. Hayes
Office DCS/IT, Headquarters
U. S. Continental Army Command
Fort Monroe, Virginia

Dr. David Krathwohl
Director
Bureau of Educational
Research
Michigan State University
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East Lansing, Michigan

Dr. A. A. Lumsdaine
Professor of Education
University of California
Los Angeles, California

Dr. Samuel D. McClelland
Acting Director
Bureau of Educational Research
Board of Education
110 Livingston Street
Brooklyn 1, New York

Dr. John Moldstad
Associate Professor of Education
Indiana University
Bloomington, Indiana

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* Latest known affiliations are given.

Dr. Philip R. Morrison
Acting Director
Center for Instructional
Communications
Syracuse University
Syracuse 10, New York

Dr. David G. Ryans, Head
Education Research and Development
System Development Corporation
2500 Colorado Avenue
Santa Monica, California

Dr. Lawrence M. Stolurow
Department of Psychology
Training Research Laboratory
University of Illinois
45 Lincoln Hall
Urbana, Illinois

Dr. Robert M. W. Travers
Western Michigan University
College of Education
Kalamazoo, Michigan 49001

Dr. Loran C. Twyford, Chief
Classroom Communications Bureau
University of the State of New York
State Education Department
Albany, New York

Dr. Paul R. Wendt,
Professor and Chairman
Department of Instructional
Materials, LIB 112
Southern Illinois University
Carbondale, Illinois

APPENDIX C

QUESTIONS

PART I.....QUESTION FORM

PART II.....EVALUATION INSTRUCTIONS

PART III.....ADDITIONAL QUESTIONS

PART I: QUESTION FORM

APPENDIX C.

Center for Documentation and Communication Research
School of Library Science
Western Reserve University
Cleveland 6, Ohio

Educational Research Experimental Questions

Name _____

QUESTION

Specific

More generic

Most generic

DEFINITIONS OF TERMS USED IN QUESTION

TERMS ASSOCIATED WITH QUESTIONS CONCEPTS

PURPOSE OF YOUR RESEARCH (50-100 WORDS)

PART II: EVALUATION INSTRUCTIONS

APPENDIX C.

Center for Documentation and Communication Research
School of Library Science
Western Reserve University

Experimental User Group

Relevant Abstract(R)

Any abstract which, on the basis of the information provided, describes research which appears to be directly or peripherally related to your question.

Evaluation Instructions

To facilitate the Center's interpretation of your evaluation, we would appreciate your following these instructions. Abstracts should be evaluated:

1. By the individual whose research need is expressed by the question.

2. In the order in which they appear on the computer listing, evaluating first the left hand column and then the right. (copies of abstracts are arranged in this sequence)

Mark "R" on the computer listing enclosed beside the number of each abstract satisfying the definition given above of a relevant abstract, even if the study described is one with which you are familiar. The absence of an "R" will indicate a nonrelevant answer.

Return the computer listing to the Center in the envelope provided. Do not return the copies of the conventional abstracts.

E N D. DEPT. OF HEALTH EDUCATION & WELFARE U.S. OFFICE OF EDUCATION E R I C!